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**Biomaterial-based immunoengineering to fight COVID-19 and infectious diseases.**

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**Funding Grants:** Biomaterial vaccine to enhance the formation of SARS-CoV-2-specific T memory stem cells

**Public Summary:**

Infection by SARS-CoV-2 virus often induces the dysregulation of immune responses, tissue damage, and blood clotting. Engineered biomaterials from the nano- to the macroscale can provide targeted drug delivery, controlled drug release, local immunomodulation, enhanced immunity, and other desirable functions to coordinate appropriate immune responses and to repair tissues. Based on the understanding of COVID-19 disease progression and immune responses to SARS-CoV-2, we discuss possible immunotherapeutic strategies and highlight biomaterial approaches from the perspectives of preventive immunization, therapeutic immunomodulation, and tissue healing and regeneration. Successful development of biomaterial platforms for immunization and immunomodulation will not only benefit COVID-19 patients, but also have broad applications for a variety of infectious diseases.

**Scientific Abstract:**

Infection by SARS-CoV-2 virus often induces the dysregulation of immune responses, tissue damage, and blood clotting. Engineered biomaterials from the nano- to the macroscale can provide targeted drug delivery, controlled drug release, local immunomodulation, enhanced immunity, and other desirable functions to coordinate appropriate immune responses and to repair tissues. Based on the understanding of COVID-19 disease progression and immune responses to SARS-CoV-2, we discuss possible immunotherapeutic strategies and highlight biomaterial approaches from the perspectives of preventive immunization, therapeutic immunomodulation, and tissue healing and regeneration. Successful development of biomaterial platforms for immunization and immunomodulation will not only benefit COVID-19 patients, but also have broad applications for a variety of infectious diseases.

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